

'Engaging with underrepresented audiences in astronomy (UnderRep)'

Abstracts

Talks

Moonsighters Academy: connecting the British Muslim community to the Cosmos

Authors

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Abstract

Across the UK, Muslim communities face a recurring challenge: the absence of a unified, locally observed Islamic lunar calendar. The Islamic month starts with the sighting of the new crescent Moon. However, with most mosques relying on moonsighting reports from other countries, Eid and other key dates are often celebrated on different days — even within the same neighbourhoods. At the heart of the issue is a lack of access to astronomical expertise within communities to conduct their own lunar observations. We have set up Moonsighters Academy, a new UK-based multidisciplinary astronomy course for emerging Muslim leaders, funded by an STFC Public Engagement Spark award.

Moonsighters Academy, running across 2025 and 2026, aims to empower communities to have local, science-informed moonsightings rooted in both tradition and collaboration. Participants have been learning the fundamental astronomy of the Islamic calendar: the lunar phase cycle; the physics of what makes a crescent visible; practical observing tips; and more. This is presented with the rich historical context of astronomy innovation in the Muslim world. We have covered community leadership and communication skills, allowing participants to become astronomy communicators in their own right and further disseminate knowledge to their communities. Monthly opportunities to observe a new crescent Moon refine the observation skills of participants, with expert guidance provided by astronomers.

The initiative not only seeks to resolve the practical issue of the Islamic calendar but also aims to inspire greater interest in astronomy. British Muslims have some of the lowest levels of science capital among all communities, and research consistently suggests Muslims face multiple forms of barriers to STEM education and careers. This is not only rooted in socioeconomic disadvantage (the latest census data reveals that 61% of Muslims live in the 40% most socioeconomically deprived areas of the UK), but also due to significant institutional challenges linked to Islamophobia, and lack of inclusion strategies in

educational and workplace settings. By fostering scientific literacy and empowering community leaders, Moonsighters Academy offers a unique model for how public engagement can address specific community needs while promoting wider astronomy. In this talk, we will describe the impact of culturally-focused, community-lead, and co-produced astronomy communication — and how it can reach new audiences. We will share what we have learnt from setting up and delivering the course, and where we hope to go next. The hope is for similar schemes to be implemented by others with experience in other communities.

Engaging Underrepresented Audiences Using Sound

Authors

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Abstract

We are all blind to the Universe, yet traditionally, astronomy communication relies on visual representations, which are not accessible to those who may need or prefer non-visual methods. Audio Universe is a collection of tools and resources to support data analysts, educators, and communicators to represent data and concepts with sound (data sonification). We are working with special educational needs (SEN) specialists, students, musicians, and astronomers to develop these resources. We will focus on two of our latest projects. Firstly, we have been developing a Sonification Suite for Planetaria and other astronomy communicators. This web-based app enables communicators to make their own sonic representations of astronomical data for use in the planetarium setting and beyond. This is built on our participatory research on effective sound designs for learning and experiential outcomes for both family and SEN audiences. Along with the App we present guidance documents and suggestions for incorporation with multi-sensory workshops. We find success of such activities across all types of audiences, showing how multi-sensory approaches have wide benefits. Secondly, we are creating our second planetarium show which does not rely on the visuals to communicate its messages. This time we'll be setting the record straight on the origin and danger of black holes!

The Warwick Mobile Planetarium: Bringing the Universe to Local Communities

Authors

Conor Byrne (1), Lauren Doyle (1), Ben Davies (1), Marcelo Aron Fetzner Keniger (1), Taf Zivave (1)

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Abstract

The Warwick Mobile Planetarium is a key component of the University of Warwick's Physics Outreach programme, designed to bring immersive astronomy experiences directly to schools, community groups, and public events. The project places a strong emphasis on widening participation, actively engaging with schools in under-represented and disadvantaged areas to ensure that young people from all backgrounds have access to inspiring science experiences.

The planetarium programme is run by staff and student volunteers, creating opportunities for participants to interact directly with scientists and ask questions about astronomy, space missions, and careers in science. This direct engagement makes scientific research accessible, allowing young audiences to connect with real researchers and students working in physics and astronomy.

With funding from STFC and support from the University of Warwick Physics Department, new equipment was recently procured, including a larger inflatable dome, modern projection systems, and updated software. These upgrades have significantly improved the quality of the experience, allowing us to accommodate larger school groups and expand the range of content we can present.

Since late 2023, the Warwick Mobile Planetarium has participated in over 80 outreach events, with staff and student volunteers delivering around 280 shows to a combined audience of more than 4,000 people across the local community. Our poster highlights our outreach programme, its impact, our efforts to engage underrepresented communities in the local area, and lessons learned from delivering large-scale immersive astronomy outreach.

P-Star: Making open source data inclusive

Authors

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Abstract

While there are numerous software and instrumental data repositories that are “open source”, their usage is often severely limited on the global stage by (1) knowledge of their existence and availability and (2) knowledge of the relevant access methods and basic usage examples for individual repositories. Within society and undergraduate education there is growing awareness of inclusivity. Open source academic data does not seem to have received the same benefit of scrutiny. Outreach initiatives can lead an effort to truly open such resources, in a responsible way.

In 2022 the last Pakistani cohort in Space Sciences graduated from the University of the Punjab, Pakistan. Key issues for discontinuation of these courses: (1) A perceived lack of paths to employment. (2) Lack of access to state-of-the-art research resources. Both concerns can be simultaneously addressed by an inclusive approach to open-source data which will help local experts to kick-start a renaissance of Space Science research.

In this presentation we report on P-star’s actions funded by an RAS outreach grant. We have generated Astronomy/Space Science undergrad teaching materials that provide employable skills in programming and numerical methods. These are taught using open-source observational data from the latest international missions and state-of-the-art open-source software for simulations. We have also sponsored grassroots events, computing infrastructure, and provide international student visibility, including by an international student conference this December.

Making astronomy inclusive to women: is better outreach the answer?

Authors

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Abstract

Women are known to make up only 20-30% of astronomers in the world. The representation is also higher among postdocs as compared to permanent academic positions, where women make up only 11-20%. Also 95-97% of female astronomers in the UK are found to be white. This denotes a significant lack of women in general and women of colour in specific in the astronomy community. This necessitates a more strategic and thorough approach to outreach and engagement in the field. The traditional and prevailing methods of outreach in the field often miss the mark. Underrepresented groups often struggle with unique problems connected to factors like imposter syndrome and performance anxiety, due to which usual outreach programs fail to provide the required opportunities to such groups where engagement is needed the most. In our talk we study the experiences of astronomers contributing to outreach in the field to explore the factors that prevalent engagement programs lack due to which they are not effectively geared towards underrepresented groups like women in general and women of colour in specific. We explore the role of engagement and outreach in increasing inclusivity towards women. We explore different pathways of improving engagement methods to significantly increase the diversity and representation of women in astronomy.

Stargazing from the Periphery: Eight Years of Astronomy and STEAM Outreach for Underrepresented Communities in Guatemala and Mesoamerica (Online)

Authors

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Abstract

Here is the abstract trimmed to approximately 2,500 characters:

Guatemala and the broader Mesoamerican region reflect a global challenge in astronomy outreach: populations that are primarily rural, Indigenous (Mayan), and largely excluded from formal science education pipelines. Language, economic, and cultural barriers compound for women, Indigenous adolescents, and highland communities, rendering conventional outreach strategies inadequate. For communities in the Global South, where structural inequities are further compounded by geography, language, and colonial legacies, addressing these gaps demands both urgency and ingenuity.

Established in 2017 with support from the US Embassy in Guatemala, this STEAM outreach initiative was designed to engage historically marginalized communities in astronomy and science. Over eight years, the program reached over 2.1 million people through online seminars, provided direct instruction to more than 18,000 K–12 students, and delivered professional development to over 16,000 in-service teachers — placing it among the largest grassroots astronomy engagement programs in Latin America.

A defining case study is the work at Instituto Nacional de Educación Diversificada Emilio Rosales Ponce in Cobán, Alta Verapaz, a primarily Q'eqchi' Mayan region. Reaching over 800 students, the program used inquiry-led activities linking astronomical concepts to Q'eqchi' oral tradition and environmental knowledge — requiring no instrumentation or clear skies. Mayan cosmovision's astronomical legacy provided genuine conceptual entry points, and post-engagement feedback revealed meaningful shifts in students' perceptions of science, with young women reporting they could "imagine themselves" in scientific roles.

During the 2023 annular and 2024 total solar eclipses, the program mobilized schools and communities across Mexico and Central America using NASA GLOBE Observer protocols. Participants contributed atmospheric and biological data to an international citizen science database, producing a qualitative shift in self-perception as scientists. A partnership with Astronomers Without Borders enabled distribution of over 30,000 certified solar viewing glasses throughout the region, while facilitators bridged Indigenous cosmological traditions with contemporary astronomical explanations.

A third pillar involved IAU NASE workshops for in-service teachers, with over 200 educators trained. Each teacher potentially reaches hundreds of students annually, creating a multiplier effect extending the program's impact well beyond direct programming. These initiatives offer a replicable model for equity-centered outreach in the Global South. Key recommendations include treating Indigenous knowledge as an epistemic partner, co-designing programming with communities, leveraging citizen science as an accessible entry point, and cultivating international partnerships as essential infrastructure for outreach at scale.

Posters

Space data archive access assessment using the FAIR principles

Authors

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Abstract

Open access to space data underpins equitable scientific research and evidence-based decision making. However, assessments of access typically focus on policy, licensing, and discoverability, with little attention to delivery performance factors that determine users' practical ability to retrieve data. We have previously developed criteria and frameworks for assessing the Findability and Accessibility of space data, using the FAIR principles of data access, and tested them on Earth Observation (EO) data. Here, we apply those criteria and frameworks to the European Space Agency's astronomy archives, to assess whether the archives offer an equitable experience to all prospective end users.

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Orbyts Research in School Partnerships: At the Heart of Great Science is Opportunity

Authors

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Abstract

STEM subjects suffer from a systemic lack of diversity and long-standing barriers to inclusion. Girls, Black students and students from low-income backgrounds are highly under-represented at all levels of physics from age 16+. Meanwhile, UK science education faces substantial shortages in physics teachers, with 1 in 4 UK schools not having a physics teacher. The Orbyts programme aims to address these issues by partnering passionate science researchers with school students to work on original science research projects. Our students have led cutting-edge research on topics ranging from explosive solar flares to planets orbiting other stars to planetary surfaces on Mars. The long-term engagement and partnership style of Orbyts projects is key to widening access to science. Orbyts researchers provide relatable role models and humanise science research on an individual level, breaking down harmful stereotypes and misconceptions of who can be a scientist. In the decade since we began Orbyts we have created more than 250 research-with-school partnerships across England (we run projects within London, South-East, Midlands, Yorkshire, and North-East England). Each school group is at least 50% pupil premium and 50% girls and gender minorities, ensuring our impact reaches those who face significant barriers to physics participation and attainment. Our programme evaluation shows that Orbyts delivers important and tangible impacts on the students – empowering them with confidence, skills, fostering a sense of belonging in science, and directly increasing post-16 STEM and higher education uptake.

Creating Space for Everyone: Reflections on Representation in Astronomy Engagement

Authors

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Abstract

This contribution explores how representation, relatability, and early exposure to science, influence engagement with astronomy amongst underrepresented audiences. A lack of relatable role models and limited access to space science enrichment opportunities diminishes perceptions of belonging and hampers awareness of astronomy as a possible area of interest or participation.

The author describes her own non-linear educational trajectory into astronomy, beginning with unsuccessful progression through A-Levels, followed by an exchange of academic pursuit for a hospitality one, to then re-engaging with academia via an Access to Higher Education course and consequently completing an undergraduate degree. The author's five-year-long experience at university, incorporating a placement year in industry and integrated Masters, ultimately facilitated her now doctoral studentship. The author, a recent awardee of the Bell-Burnell Graduate Scholarship Fund for underrepresented groups in Physics, draws on her lived experience of how gender, socioeconomic background and personal circumstances can influence perceptions of worthiness and accessibility within astronomy.

Including reflections on the contrast between everyday working environments and academic spaces, the author notes that differences in cultural expectations and familiarity with educational systems can influence confidence and perceived accessibility. This is further compounded by disparities in school resources and access to extracurricular opportunities, resulting in reduced exposure to astronomy for young learners from disadvantaged backgrounds, which impacts both awareness and confidence in pursuing these subjects later in life.

To address these challenges, several practical approaches to outreach and engagement are proposed. These include targeted provision of resources across different astronomy pathways, using accessible language and informal learning contexts to reduce perceived barriers. The value of storytelling and personal narrative in science communication is also noted as an effective method of demystifying subject content and expanding engagement. The use of low-cost and freely accessible learning resources is further advocated for, enabling flexible, self-directed engagement. These are particularly relevant for neurodivergent learners and those with caring responsibilities, for whom traditional structured delivery may not be plausible. Finally, co-creation of outreach activities with communities is championed, alongside strengthening collaboration with existing organisations such as libraries, community centres, and established independent initiatives. Overall, the author argues that effective engagement with underrepresented audiences in astronomy requires approaches that are flexible, community-informed, and grounded in relatability. Strengthening these can broaden participation to ensure that engagement with astronomy is accessible to wider and more diverse audiences.